Claims

What is claimed is:

1. A process for manufacturing a radiant barrier oriented strand board, the process comprising the steps:

(i) contacting flakes of wood with a first resin;

(ii) orienting, in substantially alternate lengthwise and crosswise layers, the flakes of wood to provide a blanket of substantially oriented flakes;

(iii) contacting the blanket of substantially oriented flakes with a radiant barrier material having apertures located therein, wherein the radiant barrier material has a pair of outer surfaces and a second resin located on at least a portion of one side of the pair of outer surfaces of the radiant barrier material, such that when the blanket of substantially oriented flakes is contacted with the radiant barrier material, the blanket of substantially oriented flakes contacts the second resin; and

(iv) curing the first resin and the second resin by exposing the first resin and the second resin to at least one of an elevated temperature, an elevated pressure, and radiant energy; for a sufficient period of time; to effectively cure the first resin and the second resin; thereby effectively providing a radiant barrier oriented strand board.

2. The process of claim 1 which exhibits a level of emissivity of less than about 0.05.

3. The process of claim 1 which exhibits a level of emissivity of less than about 0.045.

4. The process of claim 1 which exhibits a level of emissivity of less than about 0.04.

5. The process of claim 1 which exhibits a level of emissivity of less than about 0.03.

6. The process of claim 1 which exhibits a level of emissivity of less than about 0.02.

7. The process of claim 1 having a moisture vapor permeability of up to about 0.025 g/hr-m2-mm Hg.

8. The process of claim 1 having a moisture vapor permeability of up to about 0.0005 g/hr-m2-mm Hg.

9. The process of claim 1 wherein the apertures have an average diameter of greater than about 0.065 mm.

10. The process of claim 1 wherein the apertures have an average diameter of about 0.065 mm to about 3.0 mm.

11. The process of claim 1 wherein the apertures have an average diameter of about 0.08 mm to about 0.12 mm.

12. The process of claim 1 wherein the apertures are perforations.

13. The process of claim 1 wherein the apertures are plugged thereby creating a moisture vapor barrier.

14. The process of claim 1 wherein the apertures are unplugged thereby creating moisture vapor channels.

15. The process of claim 1 wherein the apertures are present in about 36 apertures per square inch of radiant barrier material or less, inclusive.

16. The process of claim 1 wherein the apertures are present in about 25 apertures per square inch of radiant barrier material or less, inclusive.

17. The process of claim 1 wherein the apertures are present in about 16 apertures per square inch of radiant barrier material or less, inclusive.

18. The process of claim 1 wherein the apertures are present in about 9 apertures per square inch of radiant barrier material or less, inclusive.

19. The process of claim 1 wherein the radiant barrier material is adhered to one outer surface of the wood-based composite panel.

20. The process of claim 1 wherein the radiant barrier material is adhered to one outer surface of the wood-based composite panel and another radiant barrier material is independently adhered to the other outer surface of the wood-based composite panel.

21. The process of claim 1 wherein the radiant barrier material is adhered to the outer surface of the wood-based composite panel employing a second resin.

22. The process of claim 21 wherein the second resin comprises a thermosetting polymer.

23. The process of claim 22 wherein the thermosetting polymer comprises a polyolefin resin.

24. The process of claim 23 wherein the polyolefin resin comprises a polyethylene resin.

25. The process of claim 1 wherein the radiant barrier material comprises a combination of metallic foil and backing material.

26. The process of claim 25 wherein the metallic foil is aluminum foil.

27. The process of claim 26 wherein the aluminum foil has a thickness of about 0.0001 inches to about 0.001 inches.

28. The process of claim 25 wherein the metallic foil has oppositely facing surfaces, one surface is relatively shiny compared to the other surface, and the shiny surface faces outwardly.

29. The process of claim 25 wherein the metallic foil has oppositely facing surfaces, one surface is relatively shiny compared to the other surface, and the shiny surface faces inwardly.

30. The process of claim 25 wherein the backing material is liner board.

31. The process of claim 30 wherein the liner board has a weight of at least 25 lbs per thousand square feet.

32. The process of claim 25 wherein the metallic foil and backing material are adhered to each other with a third resin.

33. The process of claim 32 wherein the third resin comprises an aqueous polyvinyl acetate polymer.

34. The process of claim 1 wherein the wood-based composite panel is oriented strand board.

35. The process of claim 1 which is fire retardant.

36. The process of claim 1 which is moisture resistant.

37. The process of claim 1 which is fungal resistant.

38. The process of claim 1 wherein the first resin comprises a thermosetting polymer.

39. The process of claim 38 wherein the thermosetting polymer comprises a phenolic resin, a formaldehyde resin, a resorcinolic resin, a melamine resin, an isocyanate resin, a urea resin, an epoxy resin, or a combination thereof.

40. The process of claim 1 wherein the first resin comprises a phenol-melamine-formaldehyde (PMF) resin.

41. The process of claim 1 wherein the flakes of wood are manufactured from a Western species of timber.

42. The process of claim 1 wherein the flakes of wood are manufactured from a Northern species of timber.

43. The process of claim 1 wherein the flakes of wood are manufactured from an Appalachian species of timber.

44. The process of claim 1 wherein the flakes of wood are manufactured from a Southern species of timber.

45. The process of claim 1 wherein the flakes of wood are manufactured from at least one of Incense-Cedar, Port-Orford-Cedar, Douglas Fir, White Fir, Western Hemlock, Western Larch, Lodgepole Pine, Ponderosa Pine, Sugar Pine, Western White Pine, Western Redcedar, Redwood, Engelmann Spruce, Sitka Spruce, Yellow-Cedar, Red Alder, Oregon Ash, Aspen, Black Cottonwood, California Black Oak, Oregon White Oak, Big Leaf Maple, Paper Birch, and Tanoak

46. The process of claim 1 wherein the flakes of wood are manufactured from at least one of Northern White Cedar, Balsam Fir, Eastern Hemlock, Fraser Fir, Jack Pine, Red Pine, Eastern White Pine, Eastern Red Cedar, Eastern Spruce, Tamarack, Ash, Aspen, Basswood, Buckeye, Butternut, American Beech, Birch, Black Cherry, American Chestnut, Cottonwood, Elm, Hack Berry, True Hickory, Honey Locust, Black Locust, Hard Maple, Soft Maple, Red Oak, White Oak, American Sycamore, Black Walnut, and Yellow-Poplar.

47. The process of claim 1 wherein the flakes of wood are manufactured from at least one of Atlantic White Cedar, Bald Cypress, Fraser Fir, Southern Pine, Eastern Red Cedar, Ash, Basswood, Arnecan, Beech, Butternut, Cottonwood, Elm, Hackberry, Pecan Hickory, True Hickory, Honey Locust, Black Locust, Magnolia, Soft Maple, Red Oak, Sassafras, Sweetgum, American Sycamore, Tupelo, Black Walnut, Black Willow, and Yellow Poplar.

48. The process of claim 1 wherein the flakes of wood have a length of up to about 12 inches (30.5 cm).

49. The process of claim 1 wherein the flakes of wood have a length of about 4.0 inches (10.2 cm.) to about 6.0 inches (15.2 cm).

50. The process of claim 1 wherein the flakes of wood have a width of up to about 12 inches (30.5 cm).

51. The process of claim 1 wherein the flakes of wood have a width of about 1.5 inches (3.8 cm) to about 2.5 inches (6.4 cm).

52. The process of claim 1 wherein the flakes of wood have a thickness of up to about 0.25 inches (0.64 cm).

53. The process of claim 1 wherein the flakes of wood have a thickness of about 0.020 inches (0.051 cm) to about 0.030 inches (0.076 cm).

54. The process of claim 1 wherein the flakes of wood have a strand length divided by strand width of at least 3.0.

55. The process of claim 1 wherein the first resin substantially covers the entire surface of the flake of wood.

56. The process of claim 1 wherein the first resin impregnates the flake of wood.

57. The process of claim 1 wherein the first resin completely impregnates the flake of wood.

58. The process of claim 1 wherein the first resin partially impregnates the flake of wood.

59. The process of claim 1 wherein the first resin impregnates up to about 1/10 of the flake of wood.

60. The process of claim 1 wherein the first resin impregnates up to about 1/4 of the flake of wood.

61. The process of claim 1 wherein the first resin impregnates up to about ½ of the flake of wood.

62. The process of claim 1 wherein the first resin impregnates up to about 3/4 of the flake of wood.

63. The process of claim 1 wherein the first resin impregnates up to about 99/100 of the flake of wood.

64. The process of claim 1 wherein the first resin impregnates about 1/20 to about ½ the flake of wood.

65. The process of claim 1 wherein the first resin covers at least about 60% of the surface of the flakes of wood.

66. The process of claim 1 wherein the first resin covers at least about 70% of the surface of the flakes of wood.

67. The process of claim 1 wherein the first resin covers at least about 80% of the surface of the flakes of wood.

68. The process of claim 1 wherein the first resin covers at least about 90% of the surface of the flakes of wood.

69. The process of claim 1 wherein the apertures are formed by spike rolling the radiant barrier material.

70. The process of claim 1 wherein the apertures are formed by spike rolling the radiant barrier material from the backing material side to the metallic foil side.

71. The process of claim 1 wherein the apertures are formed by spike rolling the radiant barrier material from the metallic foil side to the backing material side.

72. The process of claim 1 wherein the elevated temperature is about 162 °C (325 °F) to about 246 °C (475 °F).

73. The process of claim 1 wherein the elevated temperature is about 177 °C (350 °F) to about 232 °C (450 °F).

74. The process of claim 1 wherein the elevated temperature is about 191 °C (375 °F) to about 218 °C (425 °F).

75. The process of claim 1 wherein the elevated pressure is about 25 atm. (367 psi) to about 55 atm. (808 psi).

76. The process of claim 1 wherein the elevated pressure is about 30 atm. (441 psi) to about 50 atm. (735 psi).

77. The process of claim 1 wherein the elevated pressure is about 34 atm. (500 psi) to about 48 atm. (705 psi).

78. The process of claim 1 wherein the elevated pressure is about 35 atm. (514 psi) to about 45 atm. (661 psi).

79. The process of claim 1 wherein the sufficient period of time is up to about 10.0 minutes.

80. The process of claim 1 wherein the sufficient period of time is about 3.0 minutes to about 9.0 minutes.

81. The process of claim 1 wherein the radiant energy is UV light.

82. The process of claim 1 wherein the radiant energy is electron beam.

83. The process of claim 1 wherein the radiant energy is neutron beam.

84. The process of claim 1 wherein the radiant energy is proton beam.

85. The process of claim 1 wherein the radiant energy is microwave.

86. The process of claim 1 wherein the radiant energy is beta radiation.

87. The process of claim 1 wherein the radiant energy is gamma radiation.

88. The process of claim 1 wherein the radiant energy is infra red.

89. The process of claim 1 wherein the radiant energy is radio frequency.

90. A process for manufacturing a radiant barrier oriented strand board, the process comprising the steps:

(i) contacting flakes of wood with a first resin;

(ii) orienting, in substantially alternate lengthwise and crosswise layers, the flakes of wood to provide a blanket of substantially oriented flakes;

(iii) contacting the blanket of substantially oriented flakes with a radiant barrier material having apertures located therein, wherein the radiant barrier material has a pair of outer surfaces and a second resin located on at least a portion of one side of the pair of outer surfaces of the radiant barrier material, such that when the blanket of substantially oriented flakes is contacted with the radiant barrier material, the blanket of substantially oriented flakes contacts the second resin; and

(iv) curing the first resin and the second resin by exposing the first resin and the second resin to at least one of an elevated temperature, an elevated pressure, and radiant energy; for a sufficient period of time; to effectively cure the first resin and the second resin; thereby effectively providing a radiant barrier oriented strand board;

wherein the radiant barrier oriented strand board exhibits a level of emissivity of less than about 0.05 and a moisture vapor permeability of up to about 0.025 g/hr-m2-mm Hg.